**Waveform symmetries for Fourier Analysis**

**1.** **Even symmetry**:

f(t) = f(-t) → bn = 0 for all n → **only DC and cosine terms present**

or f(ωt) = f(-ωt)

hence a0 =

**a0 = (1.1)**

an =

or an =

**an = (1.2)**

**bn = 0 for all n**  **(1.3)**

**2.** **Odd symmetry**:

f(t) = -f(-t) → an = 0 for all n → **only sine terms present**

or f(ωt) = -f(-ωt)

hence bn =

or bn =

**bn = (2.1)**

**an = 0 for all n**  **(2.2)**

**3. Half-wave symmetry:**

f(t) = -f(t +/- T/2) → a0 , b0 = 0 for n = 0, 2, 4, 6 **...→ only odd terms**

**present**

or f(ωt) = -f(ωt +/- π)

**3.1. Even half-wave symmetry:** → **only DC and even cosine terms**

**present**

**a0 = (1.1)**

**an = (1.2)**

**n is even (2, 4, 6…)**

**bn = 0 for all n**  **(1.3)**

**3.2. Odd half-wave symmetry:** → **only odd sine terms present**

**bn = (2.1)**

**n is odd (1, 3, 5…)**

**an = 0 for all n**  **(2.2)**